

Cultural eutrophication of three midwest urban reservoirs:
The role of nitrogen limitation in determining phytoplankton community structure

Pascual, D.L., T.H. Johengen, G.M. Filippelli, L.P. Tedesco, and D.Moran

The cultural eutrophication of three Midwest urban reservoirs (Ford Lake, MI; Belleville Lake, MI; and Eagle Creek Reservoir, IN) has resulted in impaired water quality. Nutrient loading to these reservoirs has resulted in the formation of nuisance algal blooms, including possible toxin-producing and/or taste and odor causing, heterocyst-forming blue-green genera such as *Anabaena*, *Aphanizomenon*, and *Cylindrospermopsis*. Analysis of monthly nutrient concentrations (Total P, NO_3^- , NH_4^+) taken from 1998 – 2000 for two southeastern Michigan reservoirs, Ford Lake and Bellville Lake, and weekly nutrient data taken from 1976 – 1996 and bi-weekly data collected in 2003 for Eagle Creek Reservoir, Indiana showed consistent annual trends of $\text{NO}_3^- + \text{NH}_4^+$ depletion and P abundance from mid- to late summer, suggesting that phytoplankton growth became seasonally N-limited in these reservoirs. Data from the three reservoirs showed that low N-to-P ratios correlated more strongly with phytoplankton standing stock than N or P alone. Data from Eagle Creek Reservoir showed that low N-to-P ratios preceded an increase in heterocystous *Anabaena* and *Aphanizomenon* concentrations. In 2005, a combination bioassay and high resolution sampling study on Eagle Creek Reservoir began to determine if nuisance algal blooms of these heterocystous blue-green algae were preceded by transition from nitrogen rich (P-limited) to nitrogen poor (N-limited) growth conditions.